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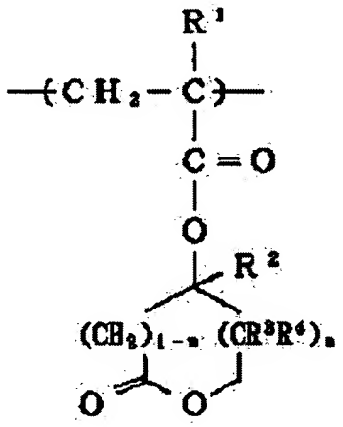
(54) CHEMICAL AMPLIFICATION TYPE PHOTORESIST COMPOSITION

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain a photoresist compsn. having high transparency to ArF excimer laser light, exhibiting superior sensitivity, resist pattern shape, dry etching resistance and adhesion and having high affinity for an alkali by incorporating acrylic resin having specified constituent units and an acid generating agent.
SOLUTION: This photoresist compsn. contains acrylic resin whose alkali solubility is varied by the action of an acid and an acid generating agent. The acrylic resin is a (meth)acrylic acid (co)polymer having constituent units represented by the formula as at least part of the constituent units. In the formula, R1 is H or methyl, each of R2-R4 is H, lower alkyl or lower alkoxy and (n) is 0 or 1. The acrylic resin may be a copolymer of a deriv. of acrylic acid having a dry etching resistance improving group or an acid dissociability protecting group with unsatd. carboxylic acid and other monomer.



LEGAL STATUS

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【0035】

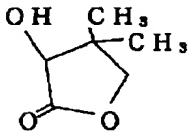
Reference Example 1

70.2 g (0.54 mol) of 4,4-dimethyl-3-hydroxy-1-oxacyclopentan-2-one and 60 g (0.60 mol) of triethylamine were dissolved in 200 ml of tetrahydrofuran, thoroughly stirred and then added to 62.4 g (0.60 mol) of metacryloylchloride by dripping at 25℃ for 1 hour.

【0036】

Next, the reaction solution was reacted at 25℃ for 24 hours and then filtered. The solvent in the filtrate was evaporated, and the residue was dissolved in 300 ml of diethyl ether and then washed 10 times with a 10 wt% sodium hydroxide solution. A methacrylic acid ester compound shown by the following formula was obtained as a clear liquid by purifying the washed residue by column chromatography using n-heptane as a solvent.

【Formula 9】



The result of ^{1}H-NMR measurement (solvent: acetone-d6) of this product confirmed peaks at 1.15 ppm, 1.25 ppm, 1.92 ppm, 4.10 ppm, 5.50 ppm, 5.62 ppm, and 6.12 ppm.

【0037】

20.0 g of the methacrylic acid ester (0.094 mol, the mol% for all of the monomers is 75 mol%) and 5.3 g of 2-tetrahydropyrranyl methacrylic acid ester (0.031 mol, the mol% for all of the monomers is 25 mol%) were dissolved in 150 g of tetrahydrofuran. A polymerization reaction was conducted at 75℃ for 3 hours using 0.82 g of azobisisobutyronitrile as a reaction initiator. After the reaction, the reactant was added to 5 l of n-heptane to separate the polymer and the obtained copolymer was dried at room temperature under reduced pressure. The copolymer (A-1) of the above polymerizable monomer and 2-tetrahydropyrranyl methacrylic acid was obtained in this manner. The yield of this copolymer was 15.0 g, with a weight

average molecular weight of 14,000 and a dispersion of 1.90.

【0046】

Reference Example 6

A polymerization reaction was carried out in the same manner as in Reference Example 1, except that 17.2 g (0.094 mol, the mol% for all of the monomers is 75 mol%) of a methacrylic acid ester shown by the following formula was used instead of the polymerizable monomer used in Reference Example 1 to obtain the copolymer (A-6) of the above monomer and 2-tetrahydropyrranyl methacrylic acid. The yield of this copolymer was 14.7 g, with a weight average molecular weight of 14,500 and a dispersion of 1.98.

【Formula 14】